PHYSICS education

Volume 13 1978

PHYSICS education

Volume 13 1978
Pages 1–460

Published by
The Institute of Physics
London and Bristol

Copyright © 1978 by The Institute of Physics and individual contributors.
All rights reserved.

Multiple copying of the contents or parts thereof without permission is in breach of copyright. Permission is usually given upon written application to the Institute to copy illustrations and short extracts from the text of individual contributions provided the source (and, where appropriate, the copyright) is acknowledged. The code at the bottom of the first column or page of an article in this periodical indicates that copies of the article may be made in the USA for personal or internal use, on condition that the copier pay the stated per copy fee to the Copyright Clearance Centre Inc., for copying beyond that permitted by Sections 107 and 108 of the US Copyright Law.

Published by
The Institute of Physics,
47 Belgrave Square, London SW1X 8QX

Printed in Great Britain by R W Hourd and Son Ltd. Set in 9/11pt Times

Index to volume 13

Subjects

(*L*) denotes letter to the Editor,
(*N*) short note,
(*R*) conference or exhibition report.

Acoustics, Why not teach *266(R)*
Airy functions and stress problems *258*
Alternative sources of energy *202*
Amount of substance *205(L)*, *269(L)*
Analogues of thermal conduction and diffusion, Electrical *295*
Apparent depth *71 (L)*
Assessing performance *1*, *268*
Astrodynamics *205(L)*, *331(L)*
Astronomical material in Nuffield O-level physics *42*
Astronomy, Spherical projections in teaching *207(L)*
Avogadro constant, More confusion over the *5(L)*

Balance, A direct-reading inertial *239*
Book reviews *9(L)*, *60*, *124*, *263*, *326*, *390*, *452*
Booth, Norman: Retirement *3*
Born, Max *251*
Brain teaser *71*, *209*
Broadcasts, Schools *10(L)*
Brownian motion—June 1827 *310*, *398(L)*

Calculators as an aid in physics teaching, Programmable *246*
Capacitance of a parallel-plate capacitor *446*
Careers Subcommittee *394*
Carnot theorems of classical thermodynamics *35*
Cathetron: Treatment of cancer of the cervix *77*
Chance and probability in children and adolescents, Ideas of *408*
Chance and teaching of physics, Ideas of *404*
Central heating multi-project pack, The *214*
Central heating of houses, The physics of *217*
CLEAPSE membership *330(N)*
Computing algorithms for Nuffield physics *424*
Concepts, Understanding *206(L)*
Controversies in physics *330*
Core syllabus for sixth-form physics, A university view on a possible *255*
Courses in physics, Newer *224–6*, *300–9*, *360–5*, *432–7*
Curriculum development, Decisions in *11*

Developing country, University physics in a *442*
Digits galore *57*

Elasticity, Early contributions to the problems of *384*
Electrical engineering, How about *139*
Electrical resistance, The concept of *116*
Electronic systems course in practice, A-level *2*
Electrostatic forces, A measurement of *344*
Energy, A mechanical experiment in kinetic *350*
Energy policy, A long-term *366*
Engineers and physics *394*
Error estimation, Teaching *8(L)*, *272(L)*
Errors, Simulation of the effects of *231*
Examinations at 18+ *267*
Examinations fair to science students, Are public *28*
Examinations in physics *70(L)*

Foils, Experiments with activated metal *353*
Fuel crops *380*

Geothermal energy and the UK *372*

Harmonic and anharmonic oscillator, The *6(L)*
Harmonic force, Simulation of the motion of a free mass under an *40*
Higher education, Physics courses in *143–200*
Holograms, All-round *38*
Holography, On-axis holograms for teaching the principles of *234*

Ice physics, Experiments in *420*
Industry, Physics education and *329(R)*
Instruments: Course in advanced physical *387*
Integrated science teaching *393*
Intensive care, Physics in *106*
Isotopic abundance of ^{40}K, Measurement of the *348*

Least-squares equations, Derivation of *123*

Magnetic domains, Observation of the dynamic behaviour of *226*
Medical electronics *101*
Medical physics: an introduction *72*
Meteorologist, How do I become a *137*
Models and physical properties, 'Real' *278*
Models as a pedogogical tool: can we learn from Maxwell *287*
Models in oscillation theory, Mathematical *282*
Models in science *267*, *275*, *396(L)*
Modular courses *329*
Mole and gases, The *6(L)*
Motional e.m.f. *203(L)*, *397 (L)*
Multiple-choice items, Ambiguity in *112*, *273(L)*

N and F levels *66(R)*, *265*

Newton and the Mint *7(L)*
Nuclear medicine, Physics in *82*
Nuclear power, safety and *202(R)*

Photon interference detector *452*
Physics courses, Content of *65, 201*
Probability distribution, Electron *273(L)*
Project in an undergraduate laboratory *241*

Quantum mechanics experiment for the undergraduate laboratory, A *22*
Quantum theory: Copenhagen revisited *337*

Radiology, New techniques in diagnostic *88*
Radiometer revisited, The *427*
Radiotherapy by external beams of ionising radiation *73*
Raindrop, Physics of a *414*
Reflectivity measurements, Quantitative *120*
Relevance of education *4(L)*
Research in schools *69*
Resistivity surveying *115*

Science teaching for, What is *438*
Soap films in a wedge *351*
Social responsibility of physicists, The *67, 110*
Society in developing countries, Physics and *357*
Society, Science in *340*
Solar technology, Aspects of *318*
Stamps: Physics on, Appendix VIII *33*
Statics and the equilibrium of the lower arm *430*
Statistical concepts in physics *393, 400*
Stereographic projection model, Constructing a *237*
Students' reactions to undergraduate science *68(R)*
Sum and difference frequencies *292*
Swansea, Open house at *2(R)*

Television in physics teaching, Applications of *53*
Temperature and molecular kinetic energy *208(L)*
Temperature measurement, High-sensitivity *236*
Terminology in education *10(L), 271(L)*
Tides as an alternative energy source *313*
Tomography, Computerised axial *92*
Transport processes in gases *19*

Ultrasonic imaging *97*
Units, New *69(N)*
University entrance, Some thoughts on *133*

V.h.f. oscillator, A simple *50*
van der Waals, Deriving *70(L), 268(L)*

Wind energy systems, Offshore *210*
Windscale Inquiry and its implications, The *333*
Writing about physics *331(N)*

Zero-gravity experiments *202(R)*

Authors with titles

(L) denotes letter to the Editor,
(N) short note,
(R) conference or exhibition report.

Alexander R S L: Some thoughts on university entrance *133*
Allen J F: Physics and electronics at St. Andrews *224*
Appleyard J H: Physics of the senses at Manchester Polytechnic *225*
Archenhold W F: Preparation for degree courses *265*
Atkinson R: Observation of the dynamic behaviour of magnetic domains *226*

Baker J G: A flexible degree course at Manchester *360*
Barritt K D: Amount of substance *205(L)*
Beech M: The social responsibility of physicists *110*
Best G T: Physics courses at the New University of Ulster *361*
Bevis G F: A-level electronic systems course in practice *2*
Biggins D R and Henderson I: What is science teaching for? *438*
Black P J: But is it physics? *201*
Bligh P: Applied science at Kingston Polytechnic *432*
Bliss J: Ideas of chance and probability in children and adolescents *408*
Boag T R: Amount of substance *205(L)*
Brown L M: Quartiles and ranges *273(L)*
Brown L M: Teaching error estimation *9(L)*
Bruzzi L: A direct-reading inertial balance *239(N)*
Bryant T H E: New techniques in diagnostic radiology *88*
Burge E J: Physics on stamps: Appendix VIII 33

Celnikier L M: Spherical projections in teaching astronomy *207(L)*
Chambers R G: Quartiles and ranges *272(L)*
Chapman B R: Assessing peformance *1*
Clark P E: A creative project in an undergraduate laboratory *241*
Clayton D G: Multiple-choice item *273(L)*
Colbeck J E: Involved families *4(L)*
Cooper M: Physics courses at Warwick *301*
Cooper M L: Early contributions to the problems of elasticity *384*
Copland G M: Physics with medical applications *304*
Cowking A, Ellington H I and Langton N H: The physics of central heating of houses *217*
Cowking A, Ellington H I and Langton N H: The central heating multi-project pack *214*
Crofts C A: Thirty years in retrospect *65*
Culpin M F: Apparent depth *71(L)*
Cuthbert L G: How about electrical engineering? *139*

Danson R: Examinations in physics *70(L)*
Davidson B J: Careers Subcommittee *394*
Davies B: Mathematical models in oscillation theory *282*
Davies G R: Some applications of television in physics teaching *53*
Delaney C M: Terminology in education *10(L)*
Delaney C M: The mole and gases *6(L)*

Ebison M: Book prices *9(L)*
Ebison M: Models in science *267*
Ellington H I: See Cowking A
Elliott A T: Physics in nuclear medicine *82*
Ellis R E: Radiotherapy by external beams of ionising radiation *73*
Ellison R J and James M G: Joint-honours degrees at Manchester *436*

Farey R A: Newton and the mint *7(L)*
Fendley J: Simulation of the motion of a free mass under an harmonic force *40*
Forbes R G: Amount of substance: an alternative proposal *269(L)*
Forbes R G: More confusion over the Avogadro constant *5(L)*
Frank C: Schoolyoung? *271(L)*
Frank F C: Airy functions in the air: an easy way with stress problems *258*
Fremlin J H: The Windscale Inquiry and its implications *333*
Fullarton G K: see Tomlin D H

Garnish J D: Geothermal energy and the UK *372*
Gee B: Models as a pedagogical tool: can we learn from Maxwell? *287*
Gee B: Newton and the mint *8(L)*
Gilmore R S: A photon interference detector with continuous display *448*
Goldman M: The radiometer revisited *427*
Gough W: Brain teaser *71*
Graham G R: All-round holograms—a simple procedure *38*
Green M G: A simple measurement of the isotopic abundance of ^{40}K *348*

Hale D P: A measurement of electrostatic forces *344*
Hale D P: Fringe capacitance of a parallel-plate capacitor *446*
Hall D O: Fuel crops *380*
Hall R B: Copenhagen revisited *337*
Harré R: Models in science *275*
Harris J and Lewis R: Digits galore *57*
Heavens O S: Modular courses *329*
Hellemans J and van Broeckhoven R: Statics and the equilibrium of the lower arm *430*
Helsdon R M: Apparent depth *71(L)*
Henderson I: see Biggins D R
Hill C R: Ultrasonic imaging *97*
Hill R: Zero-gravity experiments *202(R)*
Hinson D J: Astrodynamics *205(L), 331(L)*
Hinson D J: Brain teaser *209*
Hinson D J: Electron probability distribution *274(L)*
Hodgkinson I J: On-axis holograms for teaching principles of holography *234(N)*
Hopkins J C and Sullivan R A L: Resistivity surveying *115*
Howes R: A simple v.h.f. oscillator and its uses *50*
Howes V R: Advanced physical instruments: an undergraduate course *387*

Ioannidou-Philis A: Electron probability distribution *274(L)*
Islam A K M A: Physics and society in developing countries *357*

James M G: see Ellison R J
Johnstone A H and Mughol A R: The concept of electrical resistance *46*

Kalmus P I P: The course unit system at Queen Mary College *362*
Keohane K W: Retirement of Norman Booth *3*
Kilby G E: Astrodynamics *331(L)*
King G D: see Lovett D R
Kinsella I A and O hannaidh P B: Simulation of the effects of random measurement errors *231*

Ladd M F C: Physical science as a degree subject *308*
Langton N H: see Cowking A
Leadstone G S: High-sensitivity temperature measurement *236*
Lewis J L: Science in society *340*
Lewis R: see Harris J
Liversage W E: The treatment of cancer of the cervix using the Cathetron *77*
Logan P F: University physics teaching in a developing country *442*
Lorrain P: Motional e.m.f. *203(L)*
Lovett D R and King G D: Constructing a stereographic projection model *237(N)*
Lovett D R and Smith S R P: Soap films in a wedge *351*
Lyon A J: Quartiles and ranges *272(L)*
Lyon A J: Teaching error estimation *8(L)*

Mackinnon L: Why not teach acoustics? *266(R)*
McClelland G: Ambiguity in multiple-choice items *112*
McClelland G: Multiple-choice items *273(L)*
McVey P J: Are public examinations fair to science students? *28*
Malati M A: Experiments with activated metal foils *353*
Mansfield P: Deriving van der Waals *70(L)*
Martin P F, Murkett A J and Roe W C: Experiments in ice physics *420*

Mason B J: Physics of a raindrop *414*
Masterton D: see Schofield R
Matthew J A D: Max Born 1882–1970 *251*
Matthew J A D: The harmonic and anharmonic oscillator *6(L)*
Membrey J: Telling stories *68(R)*
Milford J R: How do I become a meteorologist? *137*
Mughol A R: see Johnstone A H
Murkett A J: see Martin P F
Musgrove P: Offshore winds energy systems *210*

Nicholson P W: Medical physics: an introduction *72*

Ogborn J: Decision in curriculum development—a personal view *11*
Ogborn J: Ideas of chance and teaching of physics *404*
O hannaidh P B: see Kinsella I A
Oliver W R: Physics education and industry *329(R)*
Ormerod M B: Models in science *396(L)*
Ormerod M B: 'Real' models and physical properties *278*
Osborne D V: Course units at East Anglia *225*
Osborne J M: Seeds of discontent *393*

Pippard A B: Statistical concepts in physics *400*
Powles J G: Brownian motion—June 1827 *310*
Prosser M T: Understanding concepts *206(L)*
Pullan B R: Computerised axial tomography *92*

Radford D T: Brownian motion *398(L)*
Randall R F Y: Physical science at Lanchester Polytechnic *433*
Remy F: A mechanical experiment on kinetic energy *350*
Richards D A: Sum and difference frequencies *292*
Roberts A M: Motional e.m.f. *204(L)*, *398(L)*
Roe W C: see Martin P F
Roy A E: Astrodynamics *205(L)*, *332(L)*

Saunders N H: Open house at Swansea *2(R)*
Saville S: EdTech 77 *27(R)*
Saville S: N and F levels *66*
Saville S: Statistical concepts in physics *393*
Schofield R: Alternative sources of energy *202*
Schofield R: Controversies in physics *330*
Schofield R and Masterton R D: ASE manufacturers' exhibition *244(R)*
Scott Archer M: Schools broadcasts *10(L)*
Senft J R: Proofs of the Carnot theorems of classical thermodynamics *35*
Shaw T L: An appraisal of the tides as an alternative energy source *312*
Sherratt W J: Astronomical material in Nuffield O-level physics *42*
Simmons D A: Astrodynamics *332(L)*
Simmons D A: Electron probability distribution *273(L)*
Smith B E: Aspects of solar technology *318*
Smith C H M: Modular degrees at Oxford Polytechnic *307*
Smith S R P: see Lovett D R
Standing Conference of Professors of Physics: A university core syllabus for sixth-form physics *255*
Sturgess J W: Physics courses at Loughborough *435*
Sullivan R A L: see Hopkins J C
Summers M K: A quantum mechanics experiment for the undergraduate laboratory *22*
Summers M K: Computing algorithms for Nuffield advanced physics *424*
Summers M K: Programmable calculators as an aid in physics teaching *246*
Summers M K: The harmonic and anharmonic oscillator *7(L)*
Sutton R A: Understanding concepts *207(L)*

Tabor D: Deriving van der Waals *269(L)*
Tanner B K: Quantitative reflectivity measurements *120*
Thring M W: A long-term energy policy *366*
Tomlin D H and Fullarton G K: Electrical circuit analogues of thermal conduction and diffusion *295*

van Broeckhoven R: see Hellemans J

Walton A J: Transport processes in gases—an alternative approach *19*
Ward L: Physics courses at Lanchester Polytechnic *364*
Warren J: Temperature and molecular kinetic energy *208(L)*
Watson B W: Medical electronics *101*
Whatcott B A: Motional e.m.f. *397(L)*
Whelan P M: Deriving van der Waals *70(L)*
Whelan P M: The mole and gases *6(L)*
Whitworth R W: Models in science *396(L)*
Williams T R: Physics in intensive care *106*
Wyatt A F G: Physics courses at Exeter *300*

Young P A: Simple derivation of the linear least-squares equations *123*

PHYSICS education

Honorary Editor
R Schofield B Sc M Inst P

Deputy Editors
B K Hodgson Ph D
R D Masterton B Sc M Inst P
S Saville B Sc M Inst P
B E Woolnough M A F Inst P

Editorial Board
K J Biggs M Sc M Inst P
J A Champion Ph D M Inst P
R W Fairbrother Ph D M Inst P
J A Gell B Sc
O S Heavens D Sc F Inst P C Eng FIEE
D Hurd B Sc M Inst P
R Lawrence Ph D M Inst P FIOA
A Loria
W K Mace B Sc
G Manwaring Ph D
P W Nicholson Ph D
P D Noakes B Sc
D R Tilley Ph D M Inst P
P J de Vries
G W T White Ph D FBCS M Inst MC
C G Woodford B Sc

Executive Editor
K F G Paulus Ph D M Inst P

Staff Editor
A P Ashby B Sc MAIE

Advertisement Manager
S Sadler

Circulation Manager
I Sadler MA

Contents of volume 13

January 1978

Decisions in curriculum development—a personal view: JON OGBORN *11*

Transport processes in gases—an alternative approach: ALAN J WALTON *19*

A quantum mechanics experiment for the undergraduate laboratory: M K SUMMERS *22*

Are public examinations fair to science students? P J MCVEY *28*

Physics on stamps: Appendix VIII: E J BURGE *33*

Proofs of the Carnot theorems of classical thermodynamics: J R SENFT *35*

Astronomical material in Nuffield O-level physics: W J SHERRATT *42*

The concept of electrical resistance: A H JOHNSTONE and A R MUGHOL *46*

A simple v.h.f. oscillator and its uses: ROBIN HOWES *50*

Some applications of television in physics teaching: G R DAVIES *53*

Digits galore: JOHN HARRIS and ROBERT LEWIS *57*

Leader *1* News and comment *2* Letters *4* Queries in physics *18* Physics apparatus *27* Notes on experiments *38* Film reviews *58* Book reviews *60* Forthcoming conferences and courses *64*

March 1978

Medical physics: an introduction: P W NICHOLSON *72*

Radiotherapy by external beams of ionising radiation: R E ELLIS *73*

The treatment of cancer of the cervix using the Cathetron: W E LIVERSAGE *77*

Physics in nuclear medicine: A T ELLIOTT *82*

New techniques in diagnostic radiology: T H E BRYANT *88*

Computerised axial tomography: B R PULLAN *92*

Ultrasonic imaging: C R HILL *97*

Medical electronics: B W WATSON *101*

Physics in intensive care: T R WILLIAMS *106*

The social responsibility of physicists: M BEECH *110*

Ambiguity in multiple-choice items: G MCCLELLAND *112*

Resistivity surveying: J C HOPKINS and R A L SULLIVAN *115*

Quantitative reflectivity measurements: B K TANNER *120*

Simple derivation of the linear least-squares equations: P A YOUNG *123*

Leader *65* News and comment *66* Letters *70* Queries in physics *109* Book reviews *124* Film reviews *127* Forthcoming conferences and courses *128*

April 1978

Introduction *129*

Some thoughts on university entrance: R S L ALEXANDER *133*

How do I become a meteorologist? J R MILFORD *137*

How about electrical engineering? L G CUTHBERT *139*

Courses in physics in England, Wales and Northern Ireland *143*

Courses in physics in Scotland *193*

Index *199*

May 1978

Offshore wind energy systems: P MUSGROVE *210*

The central heating multi-project pack: A COWKING, H I ELLINGTON and N H LANGTON *214*

The physics of central heating of houses: A COWKING, H I ELLINGTON and N H LANGTON *217*

Newer courses in physics *224*

Observations of the dynamic behaviour of magnetic domains: R ATKINSON *226*

Simulation of the effects of random measurement errors: I A KINSELLA *231*
A creative project in an undergraduate laboratory: P E CLARK *241*
Programmable calculators as an aid in physics teaching: M K SUMMERS *246*
Max Born 1882–1970: J A D MATTHEW *251*
A university view on a possible minimum core syllabus for sixth-form physics *255*
Airy functions in the air: an easy way with stress problems: F C FRANK *258*
Leader *201* News and comment *202* Letters *203* Queries in physics *223* Notes on experiments *234* Physics apparatus *244* Book reviews *263* Forthcoming conferences and courses *264*

July 1978

Models in science: R HARRÉ *275*
'Real' models and physical properties: M B ORMEROD *278*
Mathematical models in oscillation theory: BRIAN DAVIES *282*
Models as a pedagogical tool: can we learn from Maxwell? BRIAN GEE *287*
Sum and difference frequencies: D A RICHARDS *292*
Electrical circuit analogues of thermal conduction and diffusion: D H TOMLIN and G K FULLARTON *295*
Newer courses in physics *300*
Brownian motion—June 1827: J G POWLES *310*
An appraisal of the tides as an alternative energy source: T L SHAW *312*
Aspects of solar technology: B E SMITH *318*
Leader *265* News and comment *266* Letter *268* Physics apparatus *299* Queries in physics *309* Film reviews *324* Book reviews *326* Forthcoming conferences and courses *328*

September 1978

The Windscale Inquiry and its implications: J H FREMLIN *333*
Copenhagen revisited: R B HALL *337*
Science in society: JOHN L LEWIS *340*
A measurement of electrostatic forces: D P HALE *344*
Experiments with activated metal foils: M A MALATI *353*
Physics and society in developing countries: A K M A ISLAM *357*
Newer courses in physics *360*
A long-term energy policy: M W THRING *366*
Geothermal energy and the UK: J D GARNISH *372*
Fuel crops: D O HALL *380*
Early contributions to the problems of elasticity: M L COOPER *384*
Advanced physics instruments: an undergraduate course: R HOWES *387*
Leader, News and comment *329* Letters *331* Queries in physics *343* Notes on experiements *348* Book reviews *390* Film reviews *391* Forthcoming conferences and courses *392*

November 1978

Statistical concepts in physics: A B PIPPARD *400*
Ideas of chance and teaching of physics: JON OGBORN *404*
Ideas of chance and probability in children and adolescents: JOAN BLISS *408*
Physics of a raindrop: B J MASON *414*
Experiments in ice physics: P F MARTIN, A J MURKETT and W C ROE *420*
Computing algorithms for Nuffield advanced physics: M K SUMMERS *424*
The radiometer revisited: M GOLDMAN *427*
Statics and the equilibrium of the lower arm: J HELLEMANS and R VAN BROECKHOVEN *430*
Newer courses in physics *432*
What is science teaching for? DAVID R BIGGINS and IAN HENDERSON *438*
University physics teaching in a developing country: PETER F LOGAN *442*
Leader *393* News and comment *393* Letters *396* Film reviews *399* Queries in physics *441* Notes on experiments *446* Book reviews *452* Forthcoming conferences and courses *456*